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# Exceptionally coarse-grained wind ripples in the Wright Valley, Antarctica

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Ripples, with a surface composed of 1- 2 cm diameter gravel, have been described from several localities in the McMurdo Dry Valleys of Antarctica (Ackert, 1989; Henderson et al., 2002; Selby et al., 1974), but the conditions under which they form have remained a matter of controversy.

We studied the morphology and morphometry of ripples near Bull Pass in the lower Wright Valley (77°31' S; 161° 50' E) and documented their sedimentary characteristics. Wind ripple height ranges from 0.06 to 0.09 m, with ripple wavelength varying between 1.7 and 3.2 m. Ripple height increases somewhat with wavelength. The mean ripple index ranges between 49 and 88, much higher than for any wind ripples reported previously. Crest strike azimuth directions of these ripples are typically NW-SE, indicating formation by winds from the southwest (down valley).

The ripples are composed of a mixture of medium – coarse sand and medium to fine gravel, with weak bedding dipping to the north-east. The surface particle size of the ripple crests is dominated by medium gravel (9.6 mm) fining slightly to the northeast to fine gravel (6.8 mm). Ripple height and wavelength appear to increase and the ripples become better-defined and more regularly spaced as grain size decreases.

Although these ripples are clearly eolian in origin, the exact mechanism by which the coarse surface particles are moved is still not known. It appears that impacts by single saltating sand grains have insufficient force to move the larger particles, and that alternative mechanisms, perhaps including multiple saltation impacts may be required.

## References

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